

NEW AUSTRALASIAN RECORDS OF *ALLOXYSTA* FÖRSTER
(HYMENOPTERA: CYNIPOIDEA: FIGITIDAE: CHARIPINAE)
FROM THE CANADIAN NATIONAL COLLECTION OF INSECTS,
OTTAWA

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Abstract

Seven species of *Alloxysta* Förster from the Australasian region deposited in the Canadian National Collection of Insects have been determined: *Alloxysta arcuata* (Kieffer, 1902), *A. darci* (Girault, 1933), *A. fuscicornis* (Hartig, 1841), *A. rubidus* Ferrer-Suay & Pujade-Villar, 2012, *A. sawoniewiczzi* (Kierych, 1988), *A. thorpei* Ferrer-Suay & Pujade-Villar, 2012 and *A. victrix* (Westwood, 1833). *Alloxysta arcuata* (from Papua New Guinea) and *A. sawoniewiczzi* (from Sabah, Malaysia) are recorded for the first time from this region; *A. rubidus* and *A. thorpei* are newly recorded from Australia. Diagnoses for all seven species are given and their main diagnostic features illustrated. A key to identify all Charipinae species present in the Australian region is provided.

Introduction

Alloxysta Förster is the most widespread and species-rich genus within subfamily Charipinae. It is a cosmopolitan genus recorded from all biogeographical regions. These wasps are small with shiny and smooth cuticle and are morphologically similar in appearance. Ferrer-Suay *et al.* (2012a) recognised 111 valid species. The main diagnostic characters of this genus are the presence of visible tergites in the metasoma and body very smooth without mesopleural sulcus, notauli and scutellar foveae. There are few diagnostic features used to identify *Alloxysta* species: i) length of flagellomeres; ii) presence or absence of pronotal carinae; iii) presence or absence of propodeal carinae and their shape; iv) size and shape of radial cell (Ferrer-Suay *et al.* 2011).

Species of *Alloxysta* are hyperparasitoids of aphids (Hemiptera: Aphididae) via Aphidiinae (Hymenoptera: Ichneumonoidea: Braconidae) and Aphelininae (Hymenoptera: Chalcidoidea: Aphelinidae) (Menke and Evenhuis 1991). According to Carver (1992), the former Alloxystinae (*Alloxysta* + *Phaenoglyphis* Förster) are true hymenopterous hyperparasitoids of aphids and are economically important in reducing the effectiveness of Aphidiinae and *Aphelinus* as parasitoids of principally noxious hosts.

Carver (1992) extensively revised the Charipinae from Australia, including only species from *Alloxysta* and *Phaenoglyphis*. Until now, the only *Phaenoglyphis* species known from the Australian region is *P. villosa* (Hartig, 1841). As for *Alloxysta*, Carver (1992) recorded four species: *A. australiae* (Ashmead, 1900), *A. carinata* Carver, 1992, *A. darci* (Girault,

1933) and *A. fuscicornis* (Hartig, 1841). Subsequently, *Alloxysta victrix* (Westwood, 1833) was recorded from Australia when Paretas-Martínez and Pujade-Villar (2010) synonymized *Sarothrus io* Girault, 1932 with *A. victrix*. The Cynipoidea species present in Australia, including the members of subfamily Charipinae, were reviewed by Paretas-Martínez *et al.* (2013).

The main aim of this work is to improve the knowledge of *Alloxysta* from the Australasian region, largely as a result of examination of the material deposited in the Canadian National Collection of Insects. Two Palaearctic species are cited for the first time from this biogeographical region: *Alloxysta arcuata* (Kieffer, 1902) and *Alloxysta sawoniewiczzi* (Kierych, 1988). Additionally, the descriptions of *A. rubidus* and *A. thorpei* in Ferrer-Suay *et al.* (2012b) are completed with male morphology and also recorded for the first time from Australia. The main morphological features of the *Alloxysta* species present in Australia are illustrated and a key to all the Charipinae species known from the country is provided.

Materials and methods

Material studied is deposited in the Canadian National Collection of Insects, Ottawa, Canada (CNCI) and the University of Barcelona (JP-V collection), Spain (UB).

Specimens were studied using stereomicroscopy (LEICA WILD M10). The field-emission gun environmental scanning electron microscope (FEI Quanta 200 ESEM) was used for high-resolution imaging without gold coating of the specimens.

Morphological terms used are taken from Paretas-Martínez *et al.* (2007). Measurements and abbreviations include F1–F12, first and subsequent flagellomeres. The width of the forewing radial cell is measured from the margin of the wing to the beginning of the Rs vein. Females and males have the same morphology except where indicated.

For better comparison, all the female antennae of the *Alloxysta* species included in this study are grouped in Figure 1 and all radial cells in Figure 2. Figure 3 shows the types of pronotum and propodeum present in *Alloxysta* species. In Figure 4 the male antennae of the two *Alloxysta* species recently described from New Zealand (Ferrer-Suay *et al.* 2012b) and newly recorded from Australia are illustrated. Figure 5 shows different features of Charipinae useful for the identification key.

Results

Alloxysta arcuata (Kieffer, 1902)

(Figs 1a, 2a, 3a, c)

Material examined. PAPUA NEW GUINEA: 1 ♀, New Britain, xi.1913, J. St. Bick, New Guinea #3, Rec. nov 03. (In CNCI).

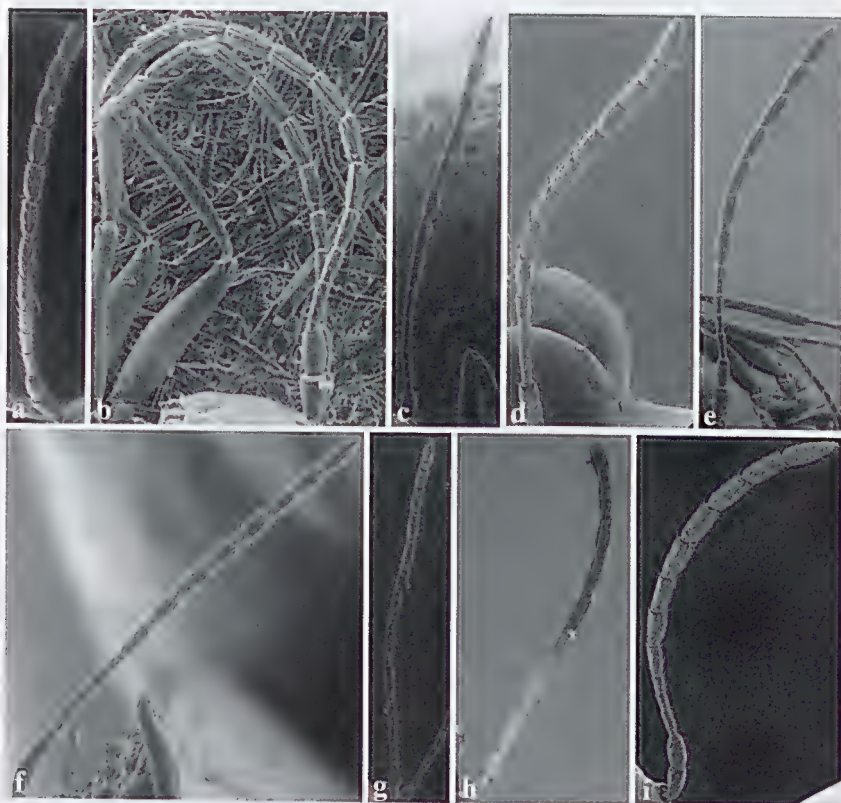


Fig. 1. Female antenna of *Alloxysta* species: (a) *A. arcuata*; (b) *A. darci*; (c) *A. fuscicornis*; (d) *A. rubidus*; (e) *A. sawoniewiczzi*; (f) *A. thorpei*; (g) *A. victrix*; (h) *A. australiae*; (i) *A. carinata*.

Diagnosis. *Alloxysta arcuata* is mainly characterized by having a small closed radial cell, pronotal carinae present, propodeal carinae forming a plate, rhinaria and club shape beginning in F3. It is similar to *Alloxysta ramulifera* (Thomson, 1862) but they can be differentiated by the starting point of the rhinaria: in F3 in *A. arcuata* (Fig. 1a) and in F4 in *A. ramulifera*; shape of the pronotal carinae: well defined and visible in *A. arcuata* (Fig. 3a) but small and sometimes difficult to see under the pubescence in *A. ramulifera*; size of radial cell: 2.3 times as long as wide in *A. arcuata* (Fig. 2a) but 2.0 times as long as wide in *A. ramulifera* and shape of propodeal carinae: with curved sides in *A. arcuata* (Fig. 3c) but with straight sides in *A. ramulifera*.

Description. Head yellowish brown in female (more yellowish in male), mesosoma and metasoma dark brown; scape, pedicel, F1 and F2 dark yellow, F3-F12 brown; legs yellow and veins yellowish brown. Female antenna 13-segmented; F1-F2 smooth, thinner than remaining ones; club begins in F3 but it is more evident from F4, F4-F11 with rhinaria; F1 subequal to pedicel, F1 longer than F2, F2-F4 subequal (Fig. 1a). Male antenna 14-segmented; F1 smooth, thinner than remaining flagellomeres, F2-F12 with rhinaria and club shaped; F2 sometimes slightly curved, F1 longer than pedicel, F1 subequal to F2, F2 shorter than F3 and F3 shorter than F4. Pronotum densely pubescent with two carinae clearly visible (Fig. 3a). Propodeum densely pubescent, with a central plate formed by two carinae with several setae on top; plate margins slightly curved outward (Fig. 3c). Forewing longer than body, radial cell closed, 2.3 times as long as wide in both sexes (Fig. 2a).

Distribution. Previously known from Palaearctic and Neotropical regions (Ferrer-Suay *et al.* 2012c). First record from the Australian region.

Alloxysta darci (Girault, 1933)

(Figs 1b, 2b, 3b)

Material examined. AUSTRALIA (Queensland): 2 ♀♀, Mount Lewis Road, 166°35'19''S 145°17'13''E, 900 m, 16.ix.2004, L. Masner, rainforest, sweep; 1 ♀, Gordonvale, along Mulgrave River, 30.iii.1991, sweep, forest area, J.D. Pinto; 8 ♂♂, 6 ♀♀, 8 km S. Atherton, Wongabel State Forest, 17°16'S 145°28'E, 7.ix.1994, M. Schauff, forest edge. (6 ♂♂, 6 ♀♀ in CNCI; 2 ♂♂, 3 ♀♀ in UB).

Diagnosis. *Alloxysta darci* is mainly characterized by having a small closed radial cell, pronotal carinae absent, propodeal plate, rhinaria and club shape beginning in F4, F1 shorter than pedicel and antennae longer than body length in both male and female. This species is similar to *A. brevis* (Thomson, 1862) but they can be differentiated by the antenna length: longer than body in *A. darci* and shorter in *A. brevis*; forewing with marginal setae longer in *A. darci* and shorter in *A. brevis*.

Description. Head, mesosoma brown and metasoma yellowish brown; antennae, legs and veins yellowish. Female antenna 13-segmented; F1-F3 smooth, thinner than remaining flagellomeres, F4-F11 with rhinaria and club shaped; F1 shorter than pedicel and longer than F2, F2-F4 subequal in length (Fig. 1b). Male antenna 14-segmented; F1-F3 smooth, thinner than remaining flagellomeres, F4-F12 with rhinaria and club shaped, same as female; pedicel-F3 subequal, F3 slightly shorter than F4. Pronotum with few scattered setae, without carinae present (Fig. 3b). Propodeum with many setae and two carinae forming a plate in the last half. Forewing longer than body; radial cell closed, 2.1 times as long as wide (Fig. 2b).

Distribution. Known from the Palaearctic and Australian regions (Ferrer-Suay *et al.* 2012a).

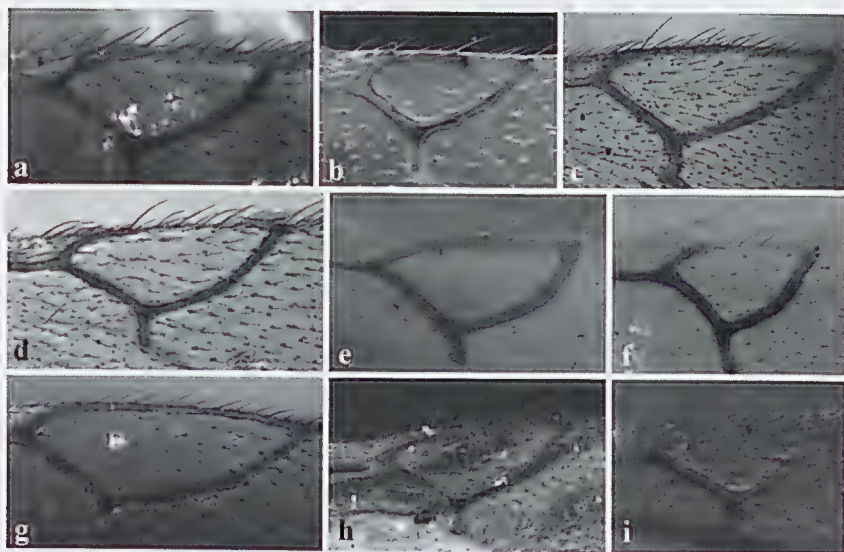


Fig. 2. Radial cell of *Alloxysta* species: (a) *A. arcuata*; (b) *A. darci*; (c) *A. fuscicornis*; (d) *A. rubidus*; (e) *A. sawoniewiczii*; (f) *A. thorpei*; (g) *A. victrix*; (h) *A. australiae*; (i) *A. carinata*.

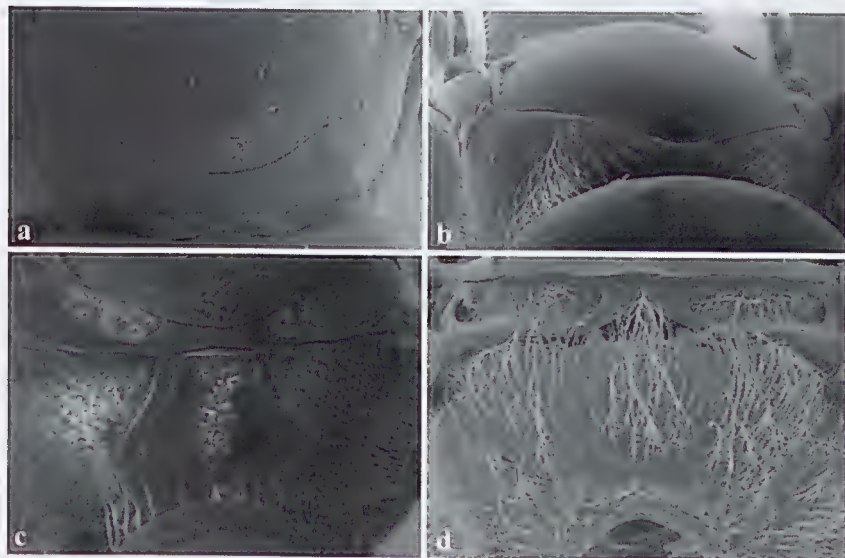


Fig. 3. Types of pronotum and propodeum: (a) pronotum of *A. arcuata*; (b) pronotum of *A. darci*; (c) propodeum of *A. arcuata*; (d) propodeum of *A. victrix*.

Alloxysta fuscicornis (Hartig, 1841)

(Figs 1c, 2c)

Material examined. AUSTRALIA: 1 ♀, Queensland, Brisbane Forest Park, 27°25'04''S 152°49'48''E, 15-22.viii.1998, N. Power, MT; 1 ♂, Victoria, Wilson's Prom Nat. Park, 10 m, 11-16.v.78, S.J. Peck, edge of *Banksia* grove. NEW ZEALAND: 1 ♀, NN, Pigeon Hill, 24.ii.1993, beating broad leaved Podocarp forest L. LeSage. (1 ♂, 1 ♀ in CNCI, 1 ♀ in UB).

Diagnosis. *Alloxysta fuscicornis* is mainly characterized by having closed radial cell, pronotal carinae present and propodeal carinae absent. It is similar to *A. circumscripta* (Hartig, 1841) but they can be differentiated by the proportion between flagellomeres: F1 longer than F2, F2 subequal to F3 in *A. fuscicornis* (Fig. 1c) and F1 subequal to F2, F2 shorter or subequal to F3 in *A. circumscripta*; size of radial cell: 2.7 times as long as wide in *A. fuscicornis* (Fig. 3c) but 2.5 times as long as wide in *A. circumscripta*.

Description. Head, mesosoma and metasoma brown; scape, pedicel, F1 and F2 yellow and F3-F12 yellowish brown; legs yellow and veins brown. Female antenna 13-segmented; F1-F3 smooth and thinner than remaining ones, F4-F11 with rhinaria and club shaped; F1 longer than pedicel and F2, F2 longer than F3, F3 shorter than F4 (Fig. 1c). Male antenna 14-segmented; with the same proportions as female but F1-F3 curved (F1 slightly curved while F2 and F3 clearly curved). Pronotum covered by setae with two carinae present clearly visible. Propodeum also with abundant setae and without carinae present. Forewing longer than body; radial cell closed, 2.7 times as long as wide (Fig. 2c).

Distribution. Cosmopolitan (Ferrer-Suay *et al.* 2012a).

Alloxysta rubidus Ferrer-Suay & Pujade-Villar, 2012

(Figs 1d, 2d, 4a, b, e)

Material examined. AUSTRALIA (Queensland): 1 ♀, Brisbane Forest Park, 27°25'04''S 152°49'48''E, 1-4.ix.1997, N. Power, MT; 1 ♀, same locality, 15-22.viii.1998, N. Power, MT; 1 ♀, Mt Tamborine, 500 m, 22.vi-6.vii.1978, S.&J. Fech, MT, wet sclerophyll, stream edge. NEW ZEALAND: 1 ♀, ND, Puketi Forest, 4.ii.1995, L. LeSage, sweep; 1 ♂, 4 ♀♀, ND, Waipona, Kauri Forest, 11-12.xii.1983, L. Masner, sweep; 1 ♀, NN, Anatimo, 23.ii.1993, vegetation by river, sweep, L. LeSage; 1 ♀, ND, Waipoua Forest, Yakas track, 6.ii.95, Taraire/Kauri forest, L. LeSage, sweep; 1 ♂, ND, Puketi Forest, 30.i-4.ii.1995, MT, L. LeSage; 1 ♀, NN, Harwoods Hole, 23.ii.1993, sphagnum bog in Nothofagus forest, L. LeSage, sweep. (1 ♂, 7 ♀♀ in CNCI, 1 ♂, 4 ♀♀ in UB).

Diagnosis. *Alloxysta rubidus* is similar to *A. thorpei* and *A. darci* because of the orange-brown body coloration and the long marginal setae on forewing, but differs from these species in: proportions of flagellomeres (*A. rubidus* has $F1 > F2$, $F2 = F3$ (Fig. 1d); *A. thorpei* has $F1 > F2$, $F2 < F3$ (Fig. 1f); *A. darci* has $F1 = F2 = F3$); shape of pronotal carinae (*A. rubidus* has two carinae

reaching to the middle point of pronotum and slightly curved; *A. thorpei* has two carinae reaching to the top of pronotum, very curved and protruding; *A. darci* does not have carinae on pronotum); shape of propodeal carinae (*A. rubidus* has only the beginning of two carinae visible, the rest of carinae are badly defined; *A. thorpei* has two carinae forming a plate in the posterior half; *A. darci* has two carinae fused forming a complete plate); and shape of radial cell (*A. rubidus* has partially open radial cell (Fig. 2d); *A. thorpei* has open radial cell (Fig. 2f); *A. darci* has closed radial cell (Fig. 2b)).



Fig. 4. Males of *A. rubidus* and *A. thorpei*: (a) *A. rubidus* antenna; (b) detail of *A. rubidus* antenna; (c) *A. thorpei* antenna; (d) detail of *A. thorpei* antenna; (e) habitus of *A. rubidus*; (f) habitus of *A. thorpei*.

Description. Head, mesosoma and metasoma reddish brown; scape yellowish brown, pedicel and F1 dark yellow, F2-F12 brown. Female antenna 13-segmented; F1-F2 smooth and thinner than remaining ones, F2-F11 with rhinaria and club shaped; F1 longer than pedicel and F2, F2 slightly shorter than F3, F3 subequal to F4 (Fig. 1d). Male antenna 14-segmented; F1 smooth and thinner than remaining ones, F2-F12 with rhinaria and club shaped; F1 longer than pedicel, F1-F3 subequal in length, F3 shorter than F4. F1 with a bump, F2 and F3 curved (Fig. 4a-b). Pronotum covered by few setae, with two thick carinae clearly visible. Propodeum covered by abundant pubescence, long marginal setae present, without carinae present. Forewing longer than body; radial cell partially open, 2.6 times as long as wide (Fig. 2d).

Distribution. Previously known from New Zealand (Ferrer-Suay *et al.* 2012b). First record from Australia.

***Alloxysta sawoniewiczzi* (Kierych, 1988)**

(Figs 1e, 2e)

Material examined. MALAYSIA: 1 ♀, Sabah, Mt Kinabalu Nat. Park, below hayang-hayang, 2600 m, 9-20.v.87, A. Smetana, FIT, B-64. (In CNCI).

Diagnosis. *Alloxysta sawoniewiczzi* is similar to *A. arcuata* because they have closed radial cell, pronotal and propodeal carinae present and F1 subequal to pedicel. However, they differ in length of antennae, beginning of rhinaria in male and female and shape of propodeal carinae: *A. sawoniewiczzi* has antennae shorter than body length, while *A. arcuata* has them longer; rhinaria begin in F5 in female (Fig. 1e) and F4 in male in *A. sawoniewiczzi* but in F3 in *A. arcuata* female (Fig. 1a) and F2 in male in *A. arcuata*; and *A. sawoniewiczzi* has the propodeal carinae narrow and well defined in the first half, wide and forming a plate in the second half with sharp edges, while *A. arcuata* has propodeal carinae forming a plate with few setae on top and sides slightly curved.

Description. Head, mesosoma and metasoma brown; antennae yellowish slightly darkening towards the end; legs dark yellow and veins yellowish brown. Female antenna 13-segmented; F1-F4 smooth and thinner than remaining ones, F5-F11 with rhinaria and club shaped; F1 subequal to pedicel and longer than F2, F2 shorter than F3 and F3 shorter than F4 (Fig. 1e). Male antenna 14-segmented; F1-F3 smooth and thinner than remaining ones, F4-F12 with rhinaria and club shaped; F1 shorter than pedicel. Pronotum with sparse setae being more abundant in anterior margin, two carinae present clearly visible. Propodeum covered by a lot of setae, two carinae narrow and well defined in the first half, wide and forming a plate in the second half, with sharp edges. Forewing longer than body; radial cell closed, 2.3 times as long as wide (Fig. 2e).

Distribution. Previously known from the Palearctic region (Ferrer-Suay *et al.* 2012a). First record from the Australasian region (Borneo).

Comments. *Alloxysta chinensis* Fülöp & Mikó, 2013 was synonymized with this species by Ferrer-Suay *et al.* (2013f).

***Alloxysta thorpei* Ferrer-Suay & Pujade-Villar, 2012**

(Figs 1f, 2f, 4c, d, f)

Material examined. AUSTRALIA (Queensland): 1 ♀, Brisbane Forest Park, 27°25'04''S 152°49'48''E, 12-19.ix.1997, N. Power, Malaise trap; 1 ♀, same locality, 10-16.x.1998, N. Power, MT, dry sclerophyll; 1 ♀, same locality, 26.ix-2.x.1998, N. Power, Malaise trap; 1 ♀, same locality, 15-22.viii.1998, N. Power, MT; 1 ♀, same locality, 7-13.iii.1998, N. Power, Malaise trap; 1 ♀, same locality, 20.ii.1998, N. Power, MT; 1 ♀, same locality, 13-20.ii.1998, N. Power, Malaise trap; 1 ♀, same locality, 1-4.ix.1997, N. Power, MT; 7 ♀♀, Mt Tamborine, 500 m, 22.vi-6.vii.1978, S.&J. Fech, MT, wet sclerophyll, stream edge; 1 ♂, 3 ♀♀, Mt Glorious Nat. Park, 630 m, 28.ii.1984, L. Masner, sweep. NEW ZEALAND: 3 ♂♂, 3 ♀♀, ND, Puketi Forest, 4.ii.1995, L. LeSage, sweep; 2 ♂♂, WD, Bullock Creek, 26.ii.1993, sweeping forest edge vegetation, L. LeSage; 1 ♂, 1 ♀, ND, Waipona, Kauri Forest, 11-12.xii.1983, L. Masner, sweep; 2 ♂♂, 3 ♀♀, NN, Pigeon Hill, 24.ii.1993, beating broad leaved Podocarp forest L. LeSage; 1 ♀, TK, Mt. Messenger, 15.xii.1983, L. Masner, sweep. (6 ♂♂, 21 ♀♀ in CNCI, 3 ♂♂, 5 ♀♀ in UB).

Diagnosis. *Alloxysta thorpei* is similar to *A. rubidus* and *A. darci* because of the orange-brown body coloration and the long marginal setae on forewing, but differs from these species in: proportions of flagellomeres (*A. thorpei* has $F1 > F2$, $F2 < F3$ (Fig. 1f); *A. rubidus* has $F1 > F2$, $F2 = F3$ (Fig. 1d); *A. darci* has $F1 = F2 = F3$); shape of pronotal carinae (*A. thorpei* has two carinae reaching to the top of pronotum, very curved and protruding; *A. rubidus* has two carinae reaching to the middle point of pronotum and slightly curved; *A. darci* does not have carinae on pronotum); shape of propodeal carinae (*A. thorpei* has two carinae forming a plate in the posterior half; *A. rubidus* has only the beginning of two carinae visible, the rest of carinae are badly defined; *A. darci* has the two carinae fused forming a complete plate); and shape of radial cell (*A. thorpei* has open radial cell (Fig. 2f); *A. rubidus* has partially open radial cell (Fig. 2d); *A. darci* has closed radial cell (Fig. 2b)).

Description. Head and distal part of metasoma yellowish brown, mesosoma and anterior part of metasoma yellowish, antennae yellowish darkening a bit distally, legs yellow and veins yellowish brown. Female antenna 13-segmented; F1-F3 smooth and thinner than remaining ones, F4-F11 with rhinaria and club shaped; F1 longer than pedicel and F2, F2 subequal to F3, F3 slightly shorter than F4 (Fig. 1f). Male antenna 14-segmented; F1-F4 smooth and thinner than remaining ones, F5-F12 with rhinaria and club shaped; F1 longer than pedicel and F2, F2 subequal to F3, F3 shorter than F4. F1 very slightly curved (Fig. 4c-d). Pronotum covered by few setae, with two

thick, long and rounded carinae clearly visible. Propodeum covered with abundant pubescence, with two carinae well defined in anterior half, separated by many setae and forming a plate in posterior half. Forewing longer than body; radial cell open, 2.3 times as long as wide (Fig. 2f).

Distribution. Previously known from New Zealand (Ferrer-Suay *et al.* 2012b). First record from Australia.

Alloxysta victrix (Westwood, 1833)

(Figs 1g, 2g, 3d)

Material examined. NEW ZEALAND: 1 ♀, Wainui Inlet (NN), 23.ii.1993, *Daucus carota* L. LeSage, sweeping flowers; 1 ♂ & 1 ♀, NN, Anatimo, 23.ii.1993, vegetation by river, sweep, L. LeSage; 7 ♀♀, NN, Pigeon Hill, 24.ii.1993, beating broad leaved Podocarp forest L. LeSage; 1 ♀, NN, Harwoods Hole, ca. 800 m, 25.ii.1993, sweeping Manuka L. LeSage; 1 ♀, NN, near Pohara, 23.ii.1993, sweep costal hill vegetation (*Macropiper*) L. LeSage; 2 ♀♀, NN, Cobb River Valley Sam Creek, 22.ii.1993, sweep along creek, L. LeSage; 3 ♀♀, NN, Cobb River Valley, 22.ii.1993, sweep around picnic area L. LeSage. (11 ♀♀ in CNCI, 5 ♀♀ in UB).

Diagnosis. *Alloxysta victrix* is mainly characterized by having a large closed radial cell, pronotal carinae present, propodeal carinae absent and yellowish head. It is similar to *A. fuscicornis* but they can be differentiated by the proportion between flagellomeres F2-F4 subequal in length in *A. victrix* (Fig. 1g), while F2 subequal to F3 and F3 shorter than F4 in *A. fuscicornis* (Fig. 1c); size of radial cell: 3.0 times as long as wide in *A. victrix* instead of 2.7 times as long as wide in *A. fuscicornis*; density of propodeal pubescence: in *A. victrix*, propodeal carinae are absent but the corresponding longitudinal areas lack setae, while the entire propodeum is densely setose in *A. fuscicornis*.

Description. Head dark yellow, mesosoma and metasoma dark brown; scape, pedicel, F1-F2 yellow, F3-F11 yellowish brown; legs yellow; veins brown. Female antenna 13-segmented; F1-F2 smooth and thinner than remaining flagellomeres, F3-F11 with rhinaria and club shaped; F1 longer than pedicel and F2, F2-F4 subequal (Fig. 1g). Male antenna 14-segmented, similar to female but with F1-F3 curved (F1 slightly curved while F2 and F3 strongly curved). Pronotum with sparse setae, two carinae clearly visible. Propodeum with abundant pubescence, no carinae present, lacking setae on longitudinal areas where carinae are present in other Charipinae species (Fig. 3d). Forewing longer than body; radial cell closed, 3.0 times as long as wide (Fig. 2g).

Distribution. Cosmopolitan (Ferrer-Suay *et al.* 2012a).

Discussion

In recent years knowledge of the worldwide Charipinae fauna has been greatly improved by the examination of important collections (*e.g.* Ferrer-

Suay *et al.* 2013a). Charipinae from the Palaearctic region have been revised in several recent works: Asia (Ferrer-Suay *et al.* 2013f), Balkan Peninsula (Ferrer-Suay *et al.* 2013c) and Iran (Ferrer-Suay *et al.* 2013b). There are other revisions from the Neotropical region (Ferrer-Suay *et al.* 2013d), the Nearctic region (Ferrer-Suay *et al.* 2014) and Africa (Ferrer-Suay *et al.* 2013e). These works have collated many new records from around the world and have included the description of many new species. As a result of these works, the view that the Charipinae is a cosmopolitan subfamily is taking weight. It has been noted that many species previously considered as Palaearctic are also present in other biogeographic regions.

The Cynipoidea from Australia were reviewed recently by Paretas-Martínez *et al.* (2013). In that work, 11 Charipinae species from four genera were recorded: *Alloxysta australiae*, *A. carinata*, *A. darci*, *A. fuscicornis*, *A. victrix*, *Dilapothor carverae*, *Phaenoglyphis villosa*, *Thoreauana giraulti*, *T. mascagnini*, *T. nativa* and *T. thoreauini*. With the newly recorded *Alloxysta rubidus* and *A. thorpei* from Australia, *A. arcuata* from Papua New Guinea and *A. sawoniewiczzi* from Borneo, 15 Charipinae species are now known from the Australasian region; these are keyed below.

Key to Australasian Charipinae species

1. Metasoma with two large visible terga, subequal in length along middorsal line, but basal tergite 1/4-1/3 smaller than second in lateral view (Fig. 5a) 2
- Metasoma with a single tergal plate, or if two, then basal tergite much shorter than second along middorsal line (Fig. 5b) 3
2. Lower part of mesopleuron with horizontal sulcus (Fig. 5c) [Only one species known from Australia] *Phaenoglyphis villosa* (Hartig, 1841)
- Mesopleuron lacks horizontal sulcus (Fig. 5d) *Alloxysta* Förster - 4
3. Head elongated in anterior view (Fig. 5e). Female antenna with 10 flagellomeres, apical club two-segmented (Fig. 5h). Three carinae at each side of the scutellum apex. Radial cell large, 2r as long as Sc+R1; Rs long and curved and giving an elongated aspect to the radial cell. Only known from Australia [Only one species known from this genus] *Dilapothor carverae* Paretas-Martínez & Pujade-Villar, 2006
- Head rounded in anterior view (Fig. 5f). Female antenna with 9 flagellomeres, apical club not segmented (Fig. 5g). One small carina present at each side of the scutellum apex. Radial cell small, 2r shorter than Sc+R1; Rs short and almost straight. [Only known from Australia] *Thoreauana* Girault, 1930 - 12
4. Radial cell closed 5
- Radial cell open or partially open 10

- 5. Propodeal carinae absent 6
- Propodeal carinae present 7



Fig. 5. Some Charipinae general features: (a) metasoma of *Alloxysta* sp.; (b) metasoma of *Dilyta* sp.; (c) mesosoma of *Phaenoglyphis* sp.; (d) mesosoma of *Alloxysta* sp.; (e) head of *Dilapothor carverae*; (f) head of *Thoreauana* sp.; (g) antenna of *Thoreauana* sp.; (h) antenna of *Dilapothor carverae*.

6. Head brown. Propodeum completely covered with dense setae. Radial cell 2.7 times as long as width (Fig. 2c) *A. fuscicornis* (Hartig, 1841)
- Head yellowish. Propodeum without setae in the longitudinal area where the carinae are present in other Charipinae (Fig. 3d). Radial cell 3.0 times as long as width (Fig. 2g) *A. victrix* (Westwood, 1833)
7. Pronotal carinae absent; F1 shorter than pedicel (Fig. 3b) *A. darci* (Girault, 1933)
- Pronotal carinae present; F1 longer or subequal to pedicel 8
8. Propodeal carinae independent, thin and straight *A. australiae* (Ashmead, 1900)
- Propodeal carinae forming a plate 9
9. Antennae shorter than body length; beginning of rhinaria in F5 in female (Fig. 1e) and F4 in male, male without any flagellomere curved; propodeal carinae narrow and well defined in the first half, wide and forming a plate in the second half with sharp edges *A. sawoniewiczzi* (Kieffer, 1902)
- Antennae longer than body length; beginning of rhinaria in F3 in female (Fig. 1a) and F2 in male, F2 slightly curved in male; propodeal carinae forming a plate with few setae on top and sides slightly curved *A. arcuata* (Kieffer, 1902)
10. Radial cell partially open; propodeum with only the beginning of two carinae visible, rest of carinae badly defined *A. rubidus* Ferrer-Suay & Pujade-Villar, 2012
- Radial cell open; propodeum with two carinae clearly visible. 11
11. F1 longer than pedicel and F2; F2 shorter than F3 (Fig. 1f); few thin straight scutellar carinae; propodeal carinae present forming a plate in the last half *A. thorpei* Ferrer-Suay & Pujade-Villar, 2012
- F1 subequal to pedicel and longer than F2; F2 subequal to F3; numerous thick and straight scutellar carinae; propodeal carinae straight and widen at the base but independent *A. carinata* Carver, 1992
12. Female unknown. Male: the club shape beginning in F3. F1 and F2 small, together shorter than pedicel and F3. F10 twice as long as the other flagellomeres, but not wider, forming a slender club *T. giraulti* Paretas-Martínez & Pujade-Villar, 2006
- The club shape beginning beyond the F3. Different size and combination between flagellomeres 13

13. Head with abundant long setae on face. F1 shorter than pedicel but F1+F2 are longer than pedicel. F1-F3 long and subequal. Club shape beginning in F4. F9 (F10 in males) forming itself a small club at the apex of the antenna; in females the club is dilated, in males the club is slender
 *T. thoreauini* (Girault, 1935)
- Head with scattered setae on face. F1 shorter than pedicel and F1+F2 still shorter than pedicel. F1-F3 very short and sometimes subequal. Club shape beginning beyond F4 14
14. Female: F2 shorter than F1 and F3; club shape beginning in F6. Male: F1-F3 subequal; club shaped begin in F4 *T. mascagnini* (Girault, 1935)
- Female: F1-F3 subequal; club shape beginning in F8. Male unknown
 *T. nativa* Girault, 1930

Conclusion

In this paper we have focused on *Alloxysta* of the Australasian Region, it being the most diverse and widespread genus within subfamily Charipinae. The two *Alloxysta* species (*A. rubidus* and *A. thorpei*) recently described from New Zealand (Ferrer-Suay *et al.* 2012b), also have been recorded from Australia and the view that these species were endemic to New Zealand is now discarded. Males of *A. rubidus* and *A. thorpei* have been collected and described for the first time, resulting in an improved knowledge of both the morphology and distribution of these species.

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